

Infestation Study of *Sclerophrys camerunensis* and *Sclerophrys regularis* (Anura: Bufonidae) by *Ascaris sp* in Mfilou and Ngamboulou Rivers in Brazzaville (Congo)

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Abstract

A study of toad infestation was carried out from July to December 2022, in the vicinity of the Mfilou and Ngamboulou Rivers, with the aim of determining the prevalence rate of parasitic carriage in these toads. After collecting 289 specimens, all belonging to the Anuran order and Bufonidae family, three species were identified: *Sclerophrys camerunensis* (Parker, 1936), *Sclerophrys regularis* (Reuss, 1834) and *Sclerophrys sp*. The most abundant species were *Sclerophrys camerunensis*, followed by *Sclerophrys regularis*. With regard to parasitological aspects, of the 289 specimens collected, 195 were parasitized, *i.e.* a percentage of 67.47%. The only parasitic species identified was *Ascaris sp*, which is preferentially located in the intestine.

Keywords

Sclerophrys camerunensis, *Sclerophrys regularis*, Nematode, Mfilou River, Gamboulou River

1. Introduction

Anurans play a very important role in the food chain balance in natural habitats, since their eggs, larvae and adults are consumed by various predators [1]-[4]. They are of vital importance to man both agriculturally, for food, culturally and traditionally, and economically [5]. In terms of food, certain species of anurans are an

important source of animal protein [2] [6]-[8]. The consumption of some of these species, has increased considerably in recent years, earning them an important place in the dietary habits of local populations [9]. As a result, these Anuran species have a very high commercial value [10]. In addition, Anurans are also of fundamental interest to agriculture due to their diet based on invertebrates in general and insects in particular [11]. This makes them a species likely to reduce the levels of insects harmful to agriculture and promote agricultural development [2].

However, anurans are hosts to many types of parasites, including nematodes [12]. These round-bodied worms can cause numerous pathologies [13]. According to [14], the pathogenic effects of parasites are numerous. Indeed, they can cause significant abnormalities in their hosts such as stunted growth, skeletal deformities, impaired eyesight, and can reduce host fecundity. Despite their pathogenic nature, studies on infestation in anurans remain fragmentary. In Africa, we can cite the work of [15]-[23]. These authors have mainly addressed the issue of parasites infesting anurans. In the Republic of Congo, there is no research on nematode infestation of anurans. Thus, this study, carried out for the first time in Congo, aims to assess the prevalence rate of Anuran parasites as well as to define their degree of infestation on the banks of two rivers in the south of Brazzaville.

2. Materials and Methods

2.1. Study Sites

Ngamboulou River and Mfilou River are located south of Brazzaville, the capital of the Republic of Congo, between 4°4' S and 15°2' E [24]. The Ngamboulou River between the ENS campus and the ex-la télé district flows into the Mfilou River between the Château d'Eau district and Moukounzi Nguouaka district. The Mfilou River flows between Diata and Massina into the Djoué. The first site, on the banks of the Ngamboulou, is located in the test garden of Marien NGOUABI University. The second site on the banks of the Mfilou River is located in the Mfilou district (**Figure 1**).

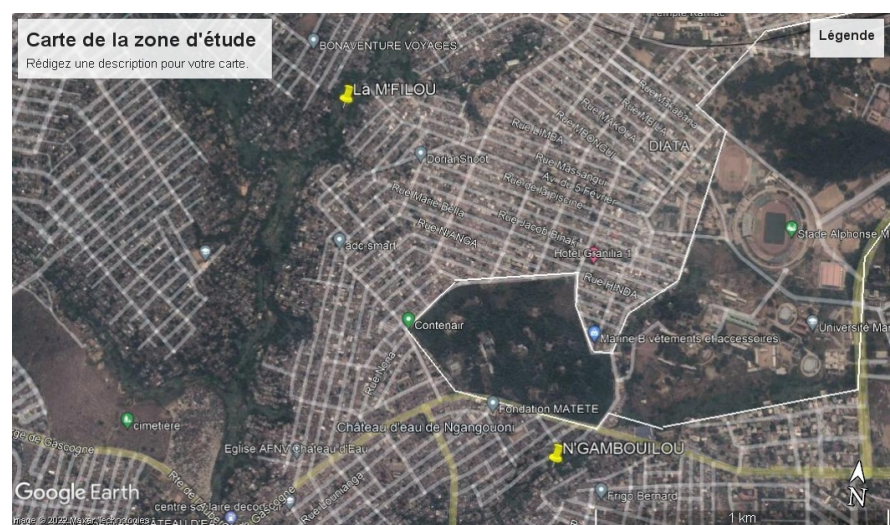


Figure 1. Map of study area.

2.2. Collection and Identification of Specimens

The various specimens were captured between July 2022 and December 2022. The toads were captured during night patrols carried out around the two rivers; the toads' croaking made it easier to locate them. The toads were then dazzled and easily captured with a gloved hand. Daytime capture was carried out by moving large stones and garbage along the banks of the rivers surveyed; the toads often found under the large stones were captured by hand.

In the laboratory, the collected specimens are poured into a plastic bucket, making it easier to sort the specimens for better identification before confirming the latter on the basis of the identification key of [25], after observation with a binocular magnifier.

2.3. Sexing, Extraction and Identification of Parasites

Dissection was carried out using the technique of [26], which involves placing the toad in dorsal recumbency on a cork plate, then making an incision using a fluted probe and scissors along the mid-ventral line from the cloaca to the head. After dissection of the toads, sex was determined by examining the gonads; stomach and intestinal contents were removed, with a view to extracting the macroscopic parasites, which were then preserved in labeled tubes containing 70° alcohol. Identification was carried out at the parasitology laboratory of the Ecole Inter-Etats de Sciences et Médecine Vétérinaires (EISMV) of Dakar Senegal.

3. Results

3.1. Parasitology Regarding *Sclerophrys camerunensis*

3.1.1. Overall Prevalence of Nematode Carriage Regarding *S. camerunensis*

The rate of infestation in *S. camerunensis* is high (87.39%), with 194 parasitized specimens and 28 unparasitized specimens (12.61%).

3.1.2. Distribution of Parasites in the Digestive Tract Regarding *S. camerunensis*

The search for parasites in the digestive tract of *S. camerunensis* showed that the intestine harbored the highest number of parasites, equal to 950. In the stomach, on the other hand, 106 parasites were counted (Figure 2).

3.1.3. Overall Infestation Rate According to Size Class Regarding *S. camerunensis*

The relationship between size classes and parasite numbers was carried out on 99 specimens of *S. camerunensis*, with body lengths ranging from 42.94 to 97.85 mm, averaging 75.01 ± 10.49 mm. Overall, specimens from classes 5 ($70.41 \leq LS < 77.27$ mm), 6 ($77.27 \leq LS < 84.13$ mm) and 7 ($84.13 \leq LS < 90.99$ mm) were the most parasitized with 172 and 114 parasites respectively, followed by classes 8 ($90.99 \leq LS < 97.85$ mm), 3 ($56.69 \leq LS < 63.55$ mm) and 4 ($63.55 \leq LS < 70.41$ mm) with

68, 37 and 18 parasites; classes 1 ($42.97 \leq LS < 49.83$ mm) and 2 ($49.83 \leq LS < 56.69$ mm) are the least represented, with 1 and 4 parasites (**Figure 3**).

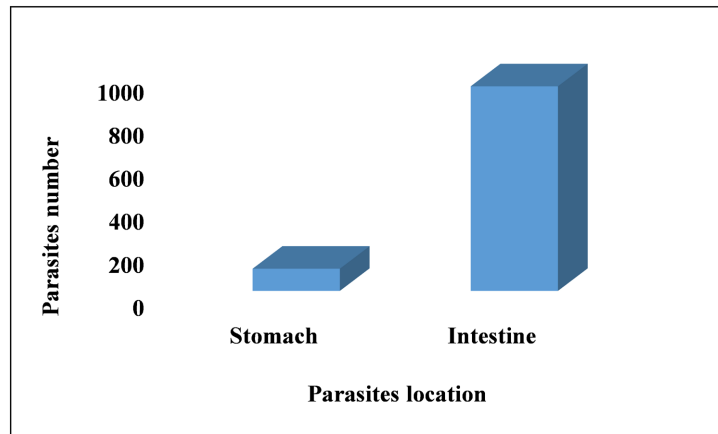


Figure 2. Parasites location site.

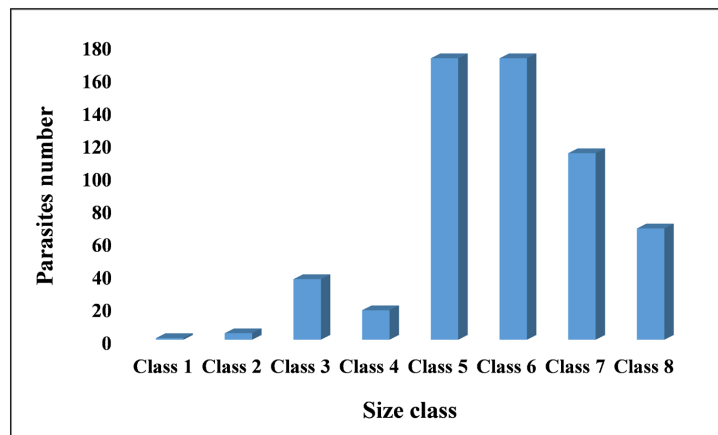


Figure 3. Overall distribution of parasites by size class.

3.1.4. Infestation Rate According to Size Class and Sex

In males, class 4 ($73.88 \leq LS < 81.86$ mm) has the highest number of parasites at 89, followed by classes 5 ($81.86 \leq LS < 89.84$ mm) and 3 ($65.90 \leq LS < 73.88$ mm) with 26 and 19 parasites respectively; classes 6 ($89.84 \leq LS < 97.83$ mm), 2 ($57.92 \leq LS < 65.90$ mm) and 1 ($49.94 \leq LS < 57.92$ mm) are the least represented with 3; 2 and 1 parasites (**Figure 4**). In females, classes 7 ($86.71 \leq LS < 94.00$ mm), 5 ($72.13 \leq LS < 79.42$ mm) and 6 ($79.42 \leq LS < 86.71$ mm) have the highest parasite load, with 151, 122 and 100 parasites respectively, followed by classes 3 ($57.85 \leq LS < 64.84$ mm) and 4 ($64.84 \leq LS < 72.13$ mm) each comprising 35 and 34 parasites; class 1 - 2 is the least infested with 4 parasites (**Figure 5**).

3.2. Parasitology Regarding *Sclerophrys regularis*

In the digestive tract of *S. regularis* specimens, the nematode parasites identified are *Ascaris sp.*

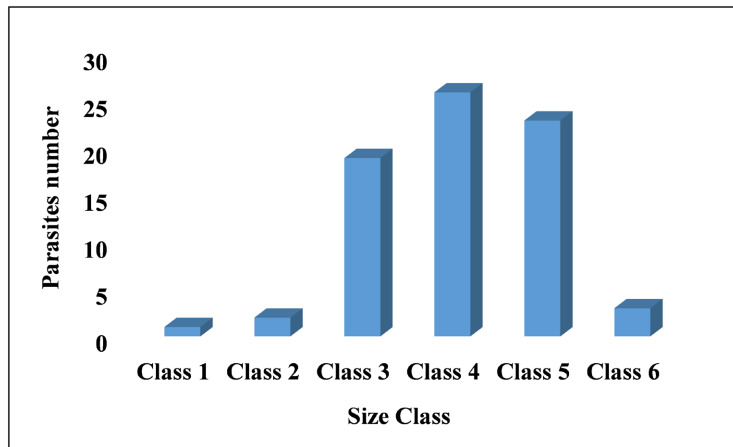


Figure 4. Distribution of parasites according to size class in *S. camerunensis* male.

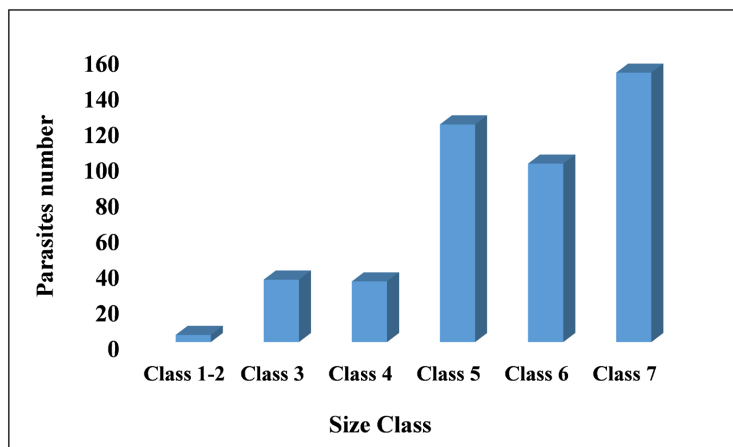


Figure 5. Distribution of parasites according to size class in *S. camerunensis* female.

3.2.1. Distribution of Parasites in the Digestive Tract Regarding Tract of *S. regularis*

Examination of the digestive tract of *S. regularis* revealed that parasites are exclusively localized in the intestine (Figure 6).

3.2.2. Overall Prevalence of Nematode Carriage Regarding *S. regularis* at the Mfilou Site

Of the *S. regularis* specimens collected along the Mfilou River, 25 are parasitized, *i.e.* 44.64%, and 30 are not parasitized, *i.e.* 55.36%.

3.2.3. Overall Infestation Rate According to Size Class Regarding *S. regularis*

The relationship between size class and number of parasites was carried out on 52 *S. regularis* specimens with body lengths ranging from 40.83 to 113.21 mm, for an average of 78.47 ± 14.46 mm. Class 5 is the modal class with 86 parasites, followed by classes 4, 6-7 and 1 with 14 and 09 parasites respectively. Classes 3 and 2 have very low numbers of parasites (Figure 7).

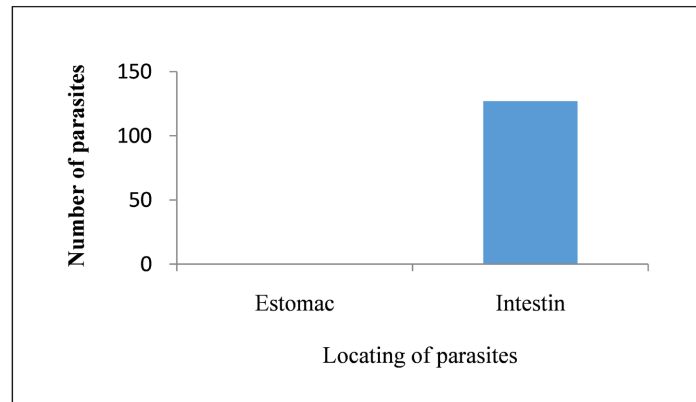


Figure 6. Parasites location site.

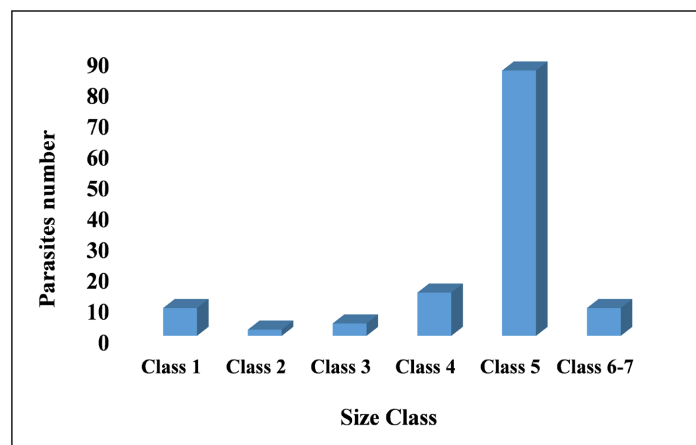


Figure 7. Overall distribution of parasites by size class.

3.2.4. Infestation Rate According to Size Class and Sex

In males, class 3 - 4 is the most represented, with 13 parasites, while class 1 - 2 has just one parasite (Figure 8). In females, class 4 has a higher number of parasites than the other classes, with 84 compared with classes 5 - 6, 3, 1 and 2, which have 12, 8, 5 and 4 respectively (Figure 9).

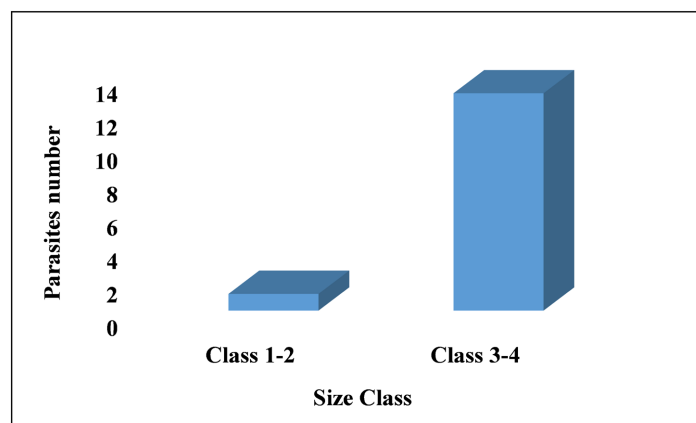


Figure 8. Distribution of parasites according to size class of males.

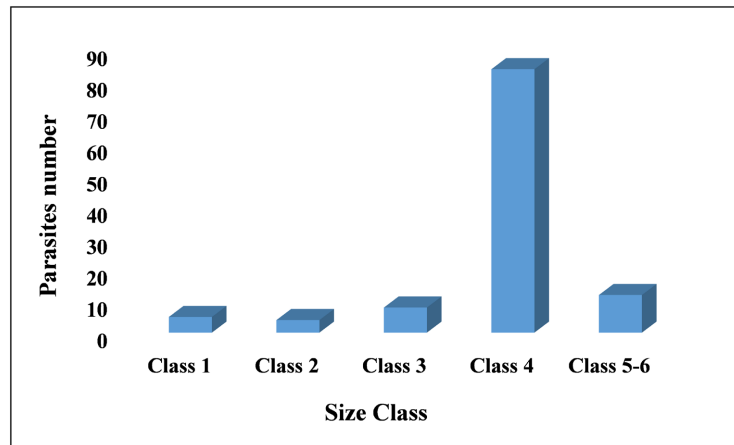


Figure 9. Distribution of parasites according to size class of females.

4. Discussion

After dissection of the 289 specimens collected in our two study sites, 195 were infested, *i.e.* a percentage of 67.47%; these results are in agreement with those of [20] [21] who obtained an overall prevalence of infestation of 67.4% in West African Anurans. For specimens of *S. camerunensis* collected at Ngamboulou, we found nearly 950 parasites, most of them in females compared with males. This difference could be explained by the high number of females compared with males, as we were able to collect more females than males. Most of these parasites were found in the intestine; only 106 parasites were identified in the stomach. These results corroborate those of [27], who worked on parasite studies of amphibian populations in the El Oued region (Algeria) and this observation was also made by [23] on parasitic studies of anurans. However, for the 42 *S. camerunensis* collected at the Mfilou site, we found 174 parasites, 47 were found in the 23 males and 127 in the 19 females. This difference can be explained by the overall mean values for weight and body length, as those of the females are higher than those of the males, even though the females are smaller than the males. For the 52 specimens of *S. regularis* collected at the Mfilou site, we listed 127 parasites, including 14 in the 10 males and 113 in the 42 females; all these parasites were identified in the intestine. The identification of parasites in our various toad specimens allowed us to list, if not identify, only one type of parasite, *Ascaris* sp. This could be explained by the fact that we were only interested in macroparasites and specific sites (stomach and intestine), which is not the case for [15] [17] [28]-[30], who found a highly diversified parasite fauna, but explored other sites in addition to the stomach and intestine, such as the rectum, lungs and bladder, using more refined parasite identification techniques.

5. Conclusion

A study of nematode infestation of *Sclerophrys camerunensis* and *Sclerophrys regularis* revealed a high level of parasitic infestation in both species. The vast majority of these parasites are located in the intestine, and only one parasite species

has been identified, namely *Ascaris sp.* Overall, in both toad species, the infestation rate increases with the individuals' size. This study was carried out by looking for nematodes visible to the naked eye; the work will need to be completed using appropriate filtering techniques, followed by content examination under the microscope. Furthermore, each part of digestive tract and lungs will be examined.

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Conflicts of INTEREST

The authors declare no conflicts of interest regarding the publication of this paper.

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